CASE REPORT JSLS

Laparoscopic Treatment for Torsion of the Gallbladder in a 7-year-old Female

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ABSTRACT

A 7-year-old girl was diagnosed with viral enteritis and was admitted to our hospital. Sudden right upper quadrant tenderness appeared 2 days after admission. Ultrasonography revealed a large thick-walled cystic gallbladder and an inflammation-induced hyperechoic cystic duct. The long axis of the gallbladder was in a horizontal rather than a vertical alignment. Computed tomography demonstrated a markedly enlarged gallbladder with a slightly thickened wall and an enhanced twisted cystic pedicle. The diagnosis of gallbladder torsion led to laparoscopic detorsion and cholecystectomy. The gallbladder was gangrenous and was rotated counterclockwise with the attachment of the mesentery to the inferior surface of the liver. Although it occurs more rarely in children than in adults, torsion of the gallbladder must be considered in the differential diagnosis of an acute abdomen. Early diagnosis and immediate laparoscopic intervention can help to achieve an excellent patient outcome.

Key Words: Torsion, Volvulus, Gallbladder.

INTRODUCTION

Torsion of the gallbladder is an uncommon entity in children, although it is commonly observed in elderly females.[1] It is known to occur when there is rotation of the gallbladder along the axis of the cystic duct and the vascular pedicle.[2,3] The rarity of gallbladder torsion and the fact that its symptoms are similar to those of acute cholecystitis make it difficult to diagnose preoperatively.[4,5] Only 19 cases of children under the age of 19 years with gallbladder torsion have been reported in the English-language medical literature to date.[3–8] Of these, only one was reported to have been treated by laparoscopic surgery.[8] We report here the case of a 7-year-old girl whose gallbladder torsion was diagnosed preoperatively and treated laparoscopically. We also review the literature of the pediatric cases of gallbladder torsion.

CASE REPORT

A 7-year-old girl was admitted to our hospital with a 6-day history of pyrexia, diarrhea, and abdominal pain. On admission, her temperature was 38.9°C, and her pulse was 102 beats/minute. Abdominal distention and right-sided abdominal tenderness without muscle guarding were noted upon the physical examination. Laboratory investigations showed a white blood cell (WBC) count of 6,000/mm^3 and C-reactive protein (CRP) levels of 0.70mg/dL. A plain abdominal X-ray showed a paralyzed intestine that was dilated with gas. Our initial diagnosis was acute enteritis due to viral infection. Sudden right upper quadrant tenderness and Murphy's sign were detected in the abdominal examination 2 days after admission. Laboratory tests revealed dramatic changes as the WBC count was 13,500/mm^3, the CRP levels were 17.39mg/dL, and the serum lactate dehydrogenase (LDH) levels were 349IU/L (normal, 106 to 211). Ultrasonography of the abdomen revealed a large thick-walled cystic gallbladder without stones. The long axis of the gallbladder was in a horizontal rather than a vertical alignment **(Figure 1A)**. An inflammation-induced hyperechoic cystic duct was detected between the inferior edge of the liver and the gallbladder **(Figure 1B)**. Abdominal computed tomography (CT) with contrast media demonstrated a markedly enlarged gallbladder that had a diameter of 63mm x 30mm

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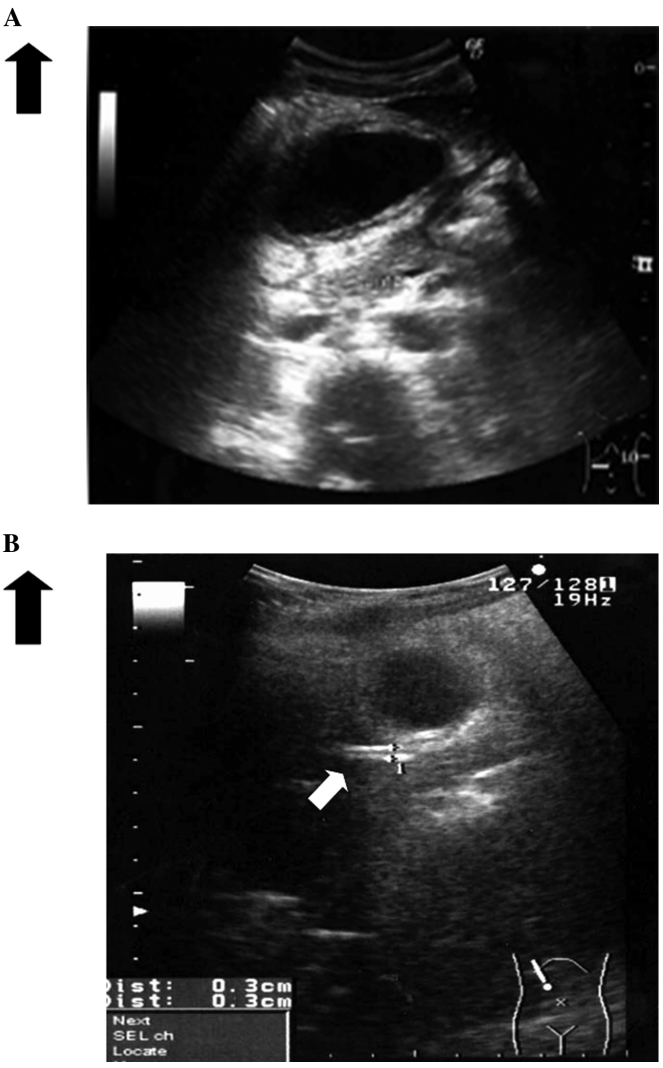

Figure 1. (A) Ultrasonography showing a large thick-walled cystic gallbladder without stones. **(B)** An inflammation-induced hyperechoic cystic duct (arrow) can be detected between the inferior edge of the liver and the gallbladder.

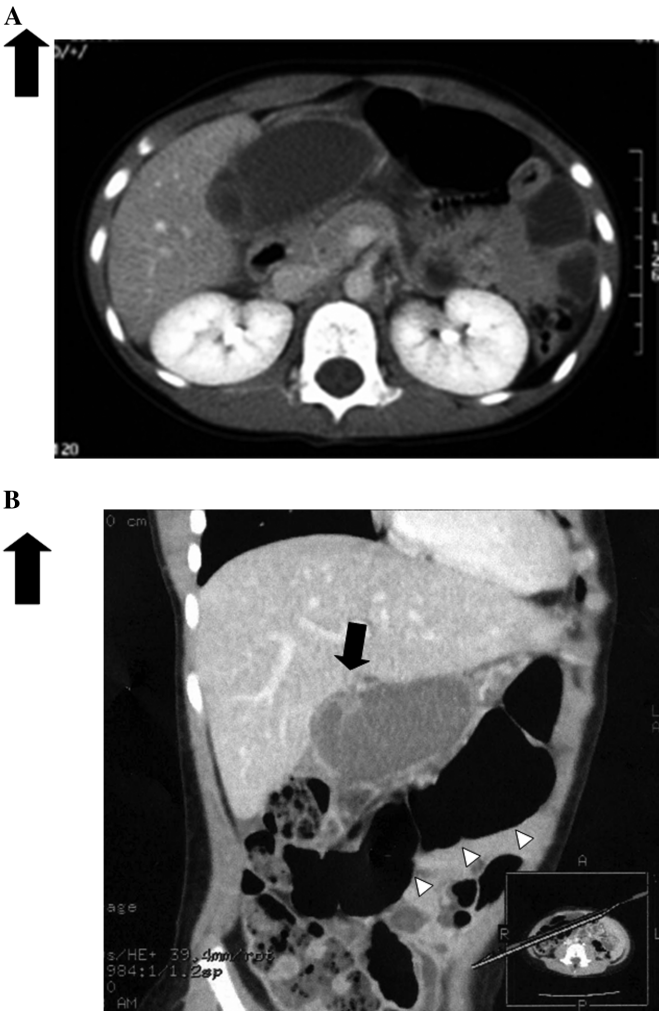

Figure 2. (A) Computed tomography showing the long axis of the gallbladder was in a horizontal rather than a vertical alignment. **(B)** Coronal imaging showing the enhanced twisted cystic pedicle connected to the liver (arrow) and the dilated transverse colon below the gallbladder (arrowheads).

and a slightly thickened wall **(Figure 2A)**. Coronal imaging showed an enhanced twisted cystic pedicle that was connected to the liver and the dilated transverse colon below the gallbladder **(Figure 2B)**. We thus diagnosed gallbladder torsion and decided to treat it laparoscopically. Laparoscopy revealed the gallbladder was lying over the greater omentum of the dilated transverse colon along with some hemorrhagic peritoneal fluid reaction and that it appeared gangrenous with a counterclockwise torsion of more than 180 degrees at the cystic duct **(Figure 3A)**. The gallbladder was attached slightly to the inferior surface of the liver via the mesentery, which allowed the gallbladder to hang free **(Figure 3B)**. Consistent with our diagnosis, we performed laparoscopic detorsion and cholecystectomy. Histological examination of the specimen revealed acute gangrenous cholecystitis with extensive necrosis of the wall. After the operation, the patient recovered without complications and was discharged on the third postoperative day.

DISCUSSION

Torsion of the gallbladder can occur at any age and in either sex but is most common in elderly females.[1] It is rare in children; only 20 pediatric cases (including our

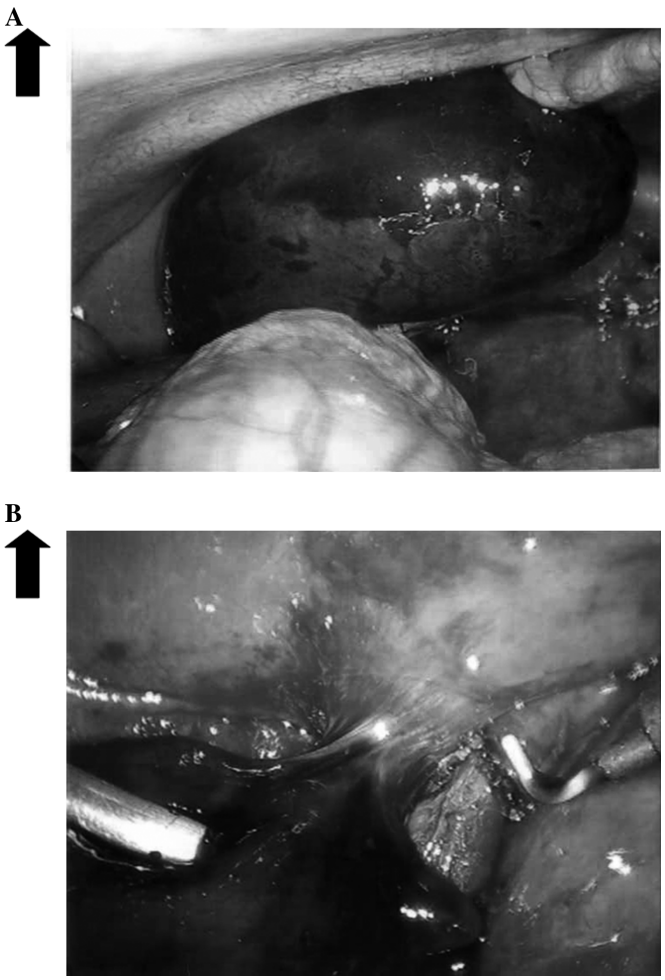

Figure 3. (A) Upon laparoscopy, the gallbladder appeared to be gangrenous and had a counterclockwise torsion of more than 180 degrees at the cystic duct. **(B)** The gallbladder was slightly attached to the inferior surface of the liver via the mesentery.

case) have been reported in the English-language medical literature to date.[3–8] The youngest reported case was of a 2-year-old child, but the peak incidence appears to be in children between 6 and 13 years of age.[3,5] Gallbladder torsion in children may be the result of a congenital anatomical predisposition that exists in 4% of the population.[2] Gross[2] has classified the congenital floating gallbladder into 2 types: type I is defined as the attachment of the gallbladder and cystic duct to the inferior surface of the liver via the mesentery as illustrated in our case, while type II involves attachment of only the cystic duct to the liver. Gallstones do not seem to be a risk factor as they were only reported in 25% to 50% of the adult cases.[9] It has been suggested that sudden body movement or blunt abdominal trauma may trigger the torsion of a mobile gallbladder in children.[10] However, in our patient, it seems that the dilation of the transverse colon due to viral enteritis induced the torsion of her gallbladder. It appears that when gallbladder torsion occurs, the vascular supply, especially the venous return of the gallbladder, is compromised and the cystic duct becomes occluded and gangrenous and may perforate.

Correct preoperative diagnosis of gallbladder torsion is difficult because of its rarity and the similarity of its symptoms and its imaging findings to acute cholecystitis.[11,12] Nakao et al[1] reported that only 9.8% of all gallbladder torsion cases (pediatric and adult) could be diagnosed preoperatively. The distinction between torsion and cholecystitis is important, because while cholecystitis can be treated conservatively initially, this type of management could prove fatal in gallbladder torsion.[13] Diagnostic imaging sometimes plays an important role in correctly diagnosing gallbladder torsion cases preoperatively, as ultrasonography often reveals a large floating gallbladder that lacks gallstones and has a thickened gallbladder wall. Specific signs of gallbladder torsion include[1] the presence of the gallbladder outside its normal anatomic fossa with an echogenic conical structure (twisted mesentery)[2]; a horizontal rather than a vertical arrangement of the long axis of the gallbladder that indicates it is floating, or[3] the presence of a well-enhanced cystic duct to the right side of the gallbladder.[5,14,15] Indeed, the horizontal arrangement of the long axis of the gallbladder and detection of an inflammation-induced hyperechoic cystic duct were important clues that led to the correct preoperative diagnosis in our case. It should be noted that while the CT findings of gallbladder torsion are also nonspecific, in a few cases of gallbladder torsion CT diagnosis revealed marked enlargement of the gallbladder and its unusual shape and configuration.[16]

Early diagnosis of gallbladder torsion and prompt surgical interventions is critical for a good outcome as this prevents the complication of perforation and the attendant bilious peritonitis. Previously, this condition was largely treated by open surgery, but increasing experience in laparoscopic cholecystectomy means that the laparoscopic approach is now recommended as the first choice. This approach has the dual benefit of confirming the diagnosis and improving the early postoperative recovery of the patient. Because the gallbladder is not fixed to the liver, detorsion and cholecystectomy can be performed easily by the laparoscopic approach.[17,18] Our case and a previously reported case show that this approach is feasible in pediatric as well as adult cases.[8]

CONCLUSION

Although it occurs more rarely in children than in adults, torsion of the gallbladder must be considered in the differential diagnosis of an acute abdomen. Early diagnosis and immediate laparoscopic intervention can help to achieve an excellent patient outcome.

References:

1. Nakao A, Matsuda T, Funabiki S, et al. Gallbladder torsion: case report and review of 245 cases reported in the Japanese literature. *J Hepatobiliary Pancreat Surg*. 1999;6:418–421.

2. Gross R. Congenital anomalies of the gallbladder. A review of 148 cases with report of a double gallbladder. *Arch Surg*. 1936;32:131–162.

3. Levard G, Weil D, Barret D, Barbier J. Torsion of the gallbladder in children. *J Pediatr Surg*. 1994;29:569–570.

4. Narchi H, Thomas M. Acute abdominal pain in a 6-year-old child. *Eur J Pediatr*. 1999;158:943–945.

5. Kitagawa H, Nakada K, Enami T, et al. Two cases of torsion of the gallbladder diagnosed preoperatively. *J Pediatr Surg*. 1997;32:1567–1569.

6. Tanaka S, Kubota D, Oba K, et al. Gallbladder torsion-induced emphysematous cholecystitis in a 16-year-old boy. *J Hepatobiliary Pancreat Surg*. 2007;14:608–610.

7. Koplewitz BZ, Manson DE, Ein SH. Posttraumatic torsion of accessory lobe of the liver and the gallbladder. *Pediatr Radiol*. 1999;29:799–802.

8. Kimura T, Yonemura T, Yamauchi K, Kosumi T, Sasaki T, Kamiyama M. Laparoscopic treatment of gallbladder volvulus: A pediatric case report and literature review. *J Laparoendosc Adv Surg Tech A*. 2008;18:330–334.

9. Janakan G, Ayantunde AA, Hoque H. Acute gallbladder torsion: an unexpected intraoperative finding. *World J Emerg Surg*. 2008;3:9.

10. Shah N. Torsion of the gall-bladder in a child. *Br J Clin Pract*. 1966;20:535–537.

11. Carter R, Thompson RJ Jr., Brennan LP, Hinshaw DB. Volvulus of the gallbladder. *Surg Gynecol Obstet*. 1963;116:105–108.

12. Wu BG, Wu CC, Chang YJ. Torsion of the gallbladder. *Surgery*. 2008;143:294–295.

13. Stieber AC, Bauer JJ. Volvulus of the gallbladder. *Am J Gastroenterol*. 1983;78:96–98.

14. Yeh HC, Weiss MF, Gerson CD. Torsion of the gallbladder: the ultrasonographic features. *J Clin Ultrasound*. 1989;17:123–125.

15. Safadi RR, Abu-Yousef MM, Farah AS, Al-Jurf AS, Shirazi SS, Brown BP. Preoperative sonographic diagnosis of gallbladder torsion: report of two cases. *J Ultrasound Med*. 1993;12:296–298.

16. Merine D, Meziane M, Fishman EK. CT diagnosis of gallbladder torsion. *J Comput Assist Tomogr*. 1987;11:712–713.

17. Reddy PK, Muralidharan M, Venkatasubramanian R, Yuvaraja S. Laparoscopic detorsion and cholecystectomy for torsion gallbladder. *JSLS*. 2005;9:238–240.

18. Amarillo HA, Pirchi ED, MihuraME. Complete gallbladder and cystic pedicle torsion: laparoscopic diagnosis and treatment. *Surg Endosc*. 2003;17:832–833.